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On the Development and Application of a Framework for Understanding the Properties and Information Quality of Online Reputation Systems

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Abstract

Online reputation systems were created to enable buyers and sellers participating in online transactions to evaluate the reputations of potential trading partners. These systems were then expanded to additional domains targeting the evaluation of encounters with professionals such as university professors, teachers, and physicians. This paper examines key properties of two online reputations systems: eBay's Feedback Forum and the Rate My Professors online reputation system. A framework for understanding the information quality of online reputation systems is then developed and applied. Implications for designers, teachers, and scholars are discussed.

Keywords: Online reputation systems; information quality; eBay Feedback Forum; Rate My Professors

1. Introduction

Many buyers and sellers participating in online marketplaces have very little direct knowledge about each other (Resnick, Zeckhauser, Friedman, & Kuwabara, 2000). Buyers contemplating entering into online transactions frequently cannot evaluate the reputations of sellers using traditional sources of information such as word-of-mouth, the location of stores, the physical appearance of stores, and the physical condition of goods they are considering purchasing. Likewise, sellers may have very little information about potential buyers of their goods.

Online reputation systems were created to narrow this information gap. Online reputation systems are systems in which users rate one another. Ratings are typically summarized to produce a score that other users can view to understand the reputation of a user (Dellarocas, 2003; Josang, Ismail, & Boyd, 2007; Petkovic, Vavilis, & Zannone, 2014). Buyers and sellers typically can use online reputation systems to rate one another along a series of dimensions. Prospective buyers and sellers can then review this information along with various aggregations of this information as a way of being more informed about potential trading partners (Bruce, Haruvy, & Rao, 2004; Keser, 2003; Lucking-Reiley, 2000). Online reputation systems have been extended into other domains in which professionals are evaluated by people with whom they are engaged. For example, students can rate their university and college professors using the Rate My Professors online reputation system (RateMyProfessors.com, 2016) and consumers of services can rate services providers using Angieslist (Angieslist, 2016). Despite the narrowing of this information gap, information quality problems can characterize online reputation systems in a variety of ways. This paper develops a framework for understanding these information quality problems.

The paper will discuss these design properties and their effects on the information quality of user ratings posted using these systems. A framework of information quality developed empirically by Wang and Strong (1996) will be applied to an analysis of the design features of online reputation systems in order to address the following research question:

> *To what extent do dimensions of information quality provide insight into the properties and information quality of online reputation systems?*

The remainder of this paper reviews the literature on online reputation systems and the information quality framework developed by Wang and Strong (1996); discusses properties of eBay's Feedback Forum and the Rate My Professors online reputation system; develops a framework for understanding the properties and information quality of online reputation systems, and applies the framework to eBay's Feedback Forum and the Rate My Professors online reputation system.

2. A Review of the Literature on Online Reputation Systems and an Information Quality Framework

The literature on online reputation systems as well as the literature on information quality inform the framework developed in this study.

2.1 Background on Online Reputation Systems

Online reputation systems have the potential to offer participants in business transactions insights into the likely future behavior of their business partners (Resnick et al., 2000). Online reputation systems have been extended to a variety of professional domains in which people seeking services can see ratings and read reviews written by people who have interacted with professionals in the past. Both of these types of online reputation systems can help users predict the future behavior of others and reach tentative answers to questions they may have. For example, will a potential buyer pay for an item if they have the winning bid in an online auction? Will a potential seller ship an item in a timely and safe fashion? Will a potential university professor teach a course in a way that a potential student will find engaging and interesting?

There are a number of threats to information quality inherent in online reputation systems. For example, a person being rated may engage in dishonest behavior in order to manipulate ratings. Examples of strategies for manipulating ratings include colluding with others to provide false ratings, paying others to provide false ratings, and using multiple

accounts to provide false ratings of one's self. Despite the existence of these strategies for manipulating ratings posted using online reputation systems, Gao, Greenwood, Argarwal, and McCullough (2015) found a positive correlation between online reviews of physician quality and offline surveys completed by the population of patients. Although the results of their study suggest that physician reviews collected in online reputation systems may have fewer information quality problems than some suspect, Gao et al. (2015) found a bias in these reviews with an overrepresentation of more favorable online ratings of physicians.

2.2 eBay's Feedback Forum

eBay is an online electronic commerce platform that allows buyers and sellers to exchange goods through both auctions and the direct purchase of goods for a stated price. The Feedback Forum implemented within eBay's online electronic commerce platform is an example of an online reputation system. Buyers and sellers can use the Feedback Forum to evaluate each other after a transaction has been completed. Ratings as well as a qualitative evaluation of the trading partner can be entered into the Feedback Forum. All feedback is associated with a single completed transaction conducted within eBay's online electronic commerce platform. Prospective buyers and sellers using eBay can view these ratings as well as the qualitative feedback in order to be informed about the past performance of potential trading partners. Prospective buyers may refrain from bidding on or purchasing goods from sellers with poor ratings, and potential sellers can refuse to enter into transactions with buyers with poor ratings.

eBay buyers can leave positive, neutral, or negative ratings of sellers. In contrast, sellers can leave only positive ratings or refrain from leaving ratings of buyers. Buyers and sellers can leave an overall rating and short comments about the other participant in a business transaction. Buyers can also leave detailed ratings of the accuracy of the item description, the seller's communication, the speed with which the item was shipped, and the reasonableness of the shipping and handling charges (How feedback works, 2016).

The ratings collected through eBay's Feedback Forum are generally viewed as valuable. Both parties to a transaction generally attempt to avoid poor ratings (McDonald & Slawson, 2002), and eBay has acted to protect the business value of this information by blocking users' efforts to show their ratings on other online platforms (Wingfield, 2002). It has been shown that the ratings of sellers affect the final selling price of goods auctioned on eBay (Ba & Pavlou, 2002; Hayne, Wang, & Wang, 2015; Houser & Wooders, 2006) with negative feedback affecting final sales prices more than positive feedback (Lucking-Reiley, Bryant, Prasad, & Reeves, 2007; Zhang, 2006). Both the quantity and quality of the ratings of a seller have been found to predict the number of bidders and the amount of bids in eBay auctions (Cabral & Li, 2016). In another empirical study using a large dataset of eBay art auctions, Canals-Cerda (2012) found that negative seller feedback affects auction outcomes as measured by the number of users bidding on an auction, the probability that the auction ends in a sale, and the ending price of auctions that end in a sale. In a study of auctions of coins, the effects of seller ratings were found to be stronger when the quality of the coin being auctioned was uncertain (Melnik & Alm, 2005). Buyers have also been found to pay more for auctions posted by established eBay sellers (Resnick, Zeckhauser, Swanson, & Lockwood, 2006). Sellers who have received negative ratings tend to not improve their reputations over time with negative ratings associated with a pattern of additional negative ratings in the future (Khopkar, Li, & Resnick, 2005).

Problems related to the information quality of ratings posted to the eBay Feedback Forum have been noted in the literature. For example, over ninety-nine percent of the ratings posted in the Feedback Forum are positive, suggesting that buyers and sellers may be reluctant to post negative feedback because of social norms or because they are afraid of receiving negative ratings from their trading partners (Dellarocas & Wood, 2008; Rietjens, 2006). It is also possible for sellers to intentionally manipulate or fabricate their ratings using strategies such as feedback padding, engaging in transactions with a low value, and bad mouthing. Feedback padding is a strategy in which sellers create multiple eBay accounts of their own or collude with other users to generate false ratings of their selling behavior through fake transactions. Engaging in transactions with a low value is another strategy that sellers can use to generate numerous positive ratings of their seller accounts. Finally, bad mouthing is a strategy in which sellers collude with other users to intentionally leave negative ratings of their competitors (Rietjens, 2006).

2.3 Rate My Professors Online Reputation System

Rate My Professors is an online reputation system which collects, aggregates, and publishes ratings of university and college professors. Students rate professors by giving an overall rating as well as by responding to questions about the

difficulty of the course, whether attendance was mandatory, whether the student would take another course with the professor, whether the class was taken for credit, and whether the textbook was used. They are also allowed to select as many as three tags to describe the professor and to provide an optional rating of the professor's 'hotness.' The options for responding to the 'hotness' survey item are 'Yeah' and 'Um, No.' Finally, students are given space to provide more specific feedback about the professor (Rate My Professors, 2016). In the past the Rate My Professors online reputation system calculated and published an overall quality rating consisting of the average of ratings of helpfulness and clarity (Freng & Webber, 2009; Stonebraker & Stone, 2015) and students were able to add comments about a course (Gregory, 2011-2012).

Ratings collected through the Rate My Professors online reputation system have been found to be significantly correlated with traditional student evaluations of teaching. Even so, problems related to the information quality of ratings available through the Rate My Professors online reputation system have been noted in the literature. For example, students can rate a professor more than one time, students can use false names, and professors can rate themselves. Additionally, the sample of students providing ratings may not be representative of the population of students enrolled in a course because students who have strong feelings about a course may be more likely to provide ratings than students without strong feelings about a course (Davison & Price, 2009; Johnson & Crews, 2013; Stonebraker & Stone, 2015). Silva et al. (2008), however, note that there are more positive comments than negative comments posted on the Rate My Professors online reputation system which suggests that it is not only dissatisfied students who are motivated to spend time entering ratings into the system. Additionally, Silva et al. (2008) performed an analysis of student comments published on the Rate My Professors system and found that comments evaluating professors of psychology are similar to those written by students on traditional course evaluation instruments. Finally, although traditional student evaluations of learning have been found to be related to student learning outcomes (e.g, Galbraith, Merrill, & Kline, 2012), a review of the literature suggests that to date the relationship between ratings available through Rate My Professors online rating systems and student learning outcomes has not been demonstrated.

2.4 Wang and Strong's Dimensions of Information Quality

Wang and Strong's (1996) taxonomy of the dimensions of information quality provides a robust and well-accepted taxonomy for conceptualizing and analyzing information quality in a wide variety of contexts. The taxonomy includes four categories of information quality each of which is divided into multiple dimensions of information quality. The four categories of information quality composing the taxonomy are intrinsic data quality, contextual data quality, representational data quality, and accessibility data quality. The intrinsic data quality category refers to aspects of data quality inherent to data and has four dimensions of data quality: believability, accuracy, objectivity, and reputation. Contextual data quality considers data quality in the context of a specific task and has five dimensions of data quality: value-added, relevancy, timeliness, completeness, and appropriate amount of data. Representational data quality refers to aspects of data quality related to data presentation and includes four dimensions of data quality: interpretability, ease of understanding, representational consistency, and concise representation. Finally, accessibility data quality refers to aspects of data quality related most directly to information system design and performance and includes two dimensions of information quality: accessibility and access security (Wang & Strong, 1996). Table 1 shows the fifteen dimensions of information quality included in the Wang and Strong (1996) framework grouped by the four information quality categories, and Appendix 1 presents the data elements used to measure each dimension of data quality. The taxonomy has been used in a wide variety of studies to assess information quality (e.g., Klein & Callahan, 2007; Klein, 2001; Klein, Valero, & Guo, 2011; Klein, Guo, & Zhou, 2016; Lee, Strong, Kahn, & Wang, 2002).

2.5 The Information Quality of Online Information

Issues related to the information quality of online information have been noted in the literature (e.g., Hawkins, 1999; Pack 1999). Although there are exceptions (e.g., Borchers, 2002; Graham & Metaxas, 2003), users of online information have generally been found to be at least somewhat aware of its information quality strengths and weaknesses (Klein, 2001; Klein & Callahan, 2007; Klein et al., 2011; Klein et al., 2016; Rieh & Belkin, 1998). This suggests that users of online reputation systems may be at least somewhat aware of the effects on information quality of the design properties of these systems.

Category	Dimension
Intrinsic data quality	1. Believability 2. Accuracy 3. Objectivity 4. Reputation
Contextual data quality	1. Value-added 2. Relevancy 3. Timeliness 4. Completeness 5. Appropriate amount of data
Representational data quality	1. Interpretability 2. Ease of understanding 3. Representational consistency 4. Concise representation
Accessibility data quality	1. Accessibility 2. Access security

Table 1. Wang and Strong (1996) Information Quality Framework

Given differences in the design of eBay's Feedback Forum and the Rate My Professors online reputation system, we would expect to find differences in the information quality of the two systems. For example, ratings may be more important to users of the eBay Feedback Forum because users have no other way to evaluate sellers. In contrast, students can use informal approaches to learn about college professors. The framework developed in the following sections of the paper provides a more formal way of examining these differences.

3. Methodology

Two online reputation systems, eBay's Feedback Forum and the Rate My Professors online reputation system, were selected as illustrative examples of online reputation systems. These two systems were selected because they are familiar to information systems scholars and because both systems have been examined in prior literature in the field.

The Wang and Strong (1996) taxonomy of the dimensions of information quality is used in conjunction with seven properties of online reputation systems to develop a framework for understanding online reputation systems.

4. Properties of eBay's Feedback Forum and the Rate My Professors Online Reputation System

Online reputation systems can be designed in a variety of ways. Seven key design properties were identified in the development of this framework based on an analysis of eBay's Feedback Forum and the Rate My Professors online reputation system as well as the literature on these two systems. These seven design properties - anonymity, authentication, reciprocity, the sampling plan, consent, tone, and timing - may affect the information quality of the ratings collected and published within the systems. Differences in the design of the eBay Feedback Forum and the Rate My Professors online reputation system can be analyzed using these seven properties of online reputation systems.

4.1 The Anonymity of Ratings in Online Reputation Systems

The property of anonymity refers to the question of whether a rating in an online reputation system can be tied to a specific, identifiable user of the online reputation system by other users viewing the rating. Ratings in eBay's Feedback Forum and the Rate My Professors online reputation system are different in the way that the issue of anonymity is handled. In eBay's Feedback Forum ratings are tied to and identified by a single eBay account (Rietjens, 2006). A user must login to their account in order to enter a rating of a buyer or seller with whom he or she engaged in a transaction. This tends to increase the accountability associated with ratings in the eBay Feedback Forum and may affect perceptions of the information quality of the information made available through the Feedback Forum. Additionally, a user can view the set of ratings a specific user has entered into the Feedback Forum which may allow users to make judgments about

the credibility of a user who has posted multiple ratings in eBay's Feedback Forum. The overall ratings and comments entered by buyers and sellers are not anonymous, and users viewing these ratings can see the name of the user account associated with each overall rating and comment. However, users who view the detailed ratings of the accuracy of the item description, the seller's communication, the speed with which the item was shipped, and the reasonableness of the shipping and handling charges are not able to see the specific user account associated with a specific detailed rating (How feedback works, 2016).

Users who enter ratings of university and college professors into the Rate My Professors online reputation system are allowed to enter these ratings anonymously. It is not possible to link all of the ratings published through the Rate My Professors system to a specific, identifiable user. Additionally, it is not possible to view the set of all of the ratings a specific user has entered into the Rate My Professors system. The anonymity of ratings in the Rate my Professors online reputation system is consistent with traditional student evaluations of teaching which are generally anonymous.

4.2 The Authentication of Ratings in Online Reputation Systems

Each of the overall ratings and comments in the eBay Feedback Forum is linked to a specific, identifiable transaction in which a seller has delivered an item that a buyer has bought and paid for (How feedback works, 2016). The detailed ratings of the accuracy of the item description, the seller's communication, the speed with which the item was shipped, and the reasonableness of the shipping and handling charges are also linked to specific user accounts and specific transactions, although users viewing these detailed ratings cannot see which user account is associated with a specific detailed ratings (How feedback works, 2016).

A rating in the Rate My Professors online reputation system may or may not be linked to a specific course taken by a specific student. It is possible for students to enter ratings of courses in which they have never been enrolled, and it is possible for students to enter ratings of professors by whom they have never been taught. It is possible for users who have never been a student at a particular university (or any university) to use the Rate My Professors online reputation system to enter ratings of courses at that university. No attempt is made to authenticate the implied claim by a user entering a rating that they have taken a particular course taught by a particular professor. In contrast, traditional student evaluations of teaching are generally limited to students enrolled in the class being rated.

4.3 Reciprocity of Ratings in Online Reputation Systems

An online reputation system with the property of reciprocity exists when two parties participating in a transaction or professional relationship enter ratings about each other. Ratings entered into eBay's Feedback Forum have the property of reciprocity. Buyers are able to enter ratings of sellers with whom they have engaged in a transaction, and sellers are able to enter ratings of buyers with whom they have engaged in a transaction. Both parties are aware that their own ratings may be affected if they enter ratings for the other party that are inaccurate or unfair. Dellarocas and Wood (2008) found both positive and negative reciprocation among eBay buyers and sellers. In a later empirical study using a large dataset, a reciprocity strategy was found in twenty to 23 percent of eBay transactions (Jian, MacKie-Mason, & Resnick, 2010). There is evidence that the behavior of eBay trading partners is affected by their awareness of reciprocity with empirical evidence suggesting that buyers tend to avoid posting negative feedback because they fear retaliation (Li, 2010).

Ratings entered into Rate My Professors do not have the property of reciprocity. Students rate professors, but professors do not rate students within the Rate My Professors online reputation system. This is also the case with traditional student evaluations of teaching.

4.4 Sampling Plan of Online Reputation Systems

All of the buyers and sellers participating in transactions through eBay's electronic commerce system are made aware that the eBay Feedback Forum exists and that they can enter ratings of their transaction partners using the Feedback Forum. Although some users may choose to not enter ratings of their transaction partners, most users are aware that the Feedback Forum exists and that they can enter ratings if they wish to do so. eBay sellers often encourage their buyers to enter ratings in order to increase the number of ratings associated with their eBay accounts.

Although some students taking courses are aware of the existence of the Rate My Professors online reputation system, there is no guarantee that all students taking courses know it exists and are aware that they have an opportunity to rate their professors. Because the Rate My Professors online reputation system does not have a direct relationship with universities, it is not possible for the online reputation system to directly contact all students enrolled in courses that can be rated using the online reputation system. Nonresponse bias can also affect traditional student evaluations of teaching, especially when evaluations are conducted online (Adams & Umbach, 2012; Bacon, Johnson, & Stewart, 2016; Nowell, Gale, & Kerkvliet, 2014).

It is possible that both the eBay Feedback Forum and the Rate My Professors online reputation systems may publish ratings entered by biased samples of the relevant populations. However, it is likely that the nature of these biases is different between the two online reputation systems because the population of users of the eBay electronic commerce site is likely to be aware of the eBay Feedback Forum whereas only a subset of the population of university students is likely to be aware of the Rate My Professors online reputation system.

4.5 Consent and Online Reputation Systems

Users who buy and sell goods using the eBay electronic commerce system understand that their performance may be rated by their transaction partners through the eBay Feedback Forum. Although users do not explicitly give consent to being rated, they give their consent implicitly when they create listings offering goods for sale or when they enter bids or offers to purchase goods that are offered for sale.

University and college professors who are rated through the Rate My Professors online reputation system do not consent to having these ratings published through this online reputation system. A user can enter a professor's name into the Rate My Professors online reputation system and enter a set of ratings for that professor without the professor's knowledge or consent. Additionally, professors are not notified when users enter ratings about them.

4.6 Tone of Online Reputation Systems

Buyers and sellers using the eBay electronic commerce system are able to rate their transaction partners by giving an overall rating (positive, neutral, or negative for ratings of sellers and positive for ratings of buyers) as well as by writing short comments. Buyers can also leave detailed ratings of the accuracy of the item description, the seller's communication, the speed with which the item was shipped, and the reasonableness of the shipping and handling charges (How feedback works, 2016). The instructions and survey items used in the eBay Feedback Forum have a professional, business-like tone. Users of the eBay Feedback Forum are instructed to "Please make sure that your comments are fair, based in fact, and relate to the specific transaction for which you received the feedback request" (How it works, 2016).

Users of the Rate My Professors online reputation system are able to rate professors by entering an overall rating as well as by providing responses to questions about the difficulty of the course, whether attendance was mandatory, whether the student would take another course with the professor, whether the class was taken for credit, and whether the textbook was used. They can also optionally evaluate the physical appearance of the professor with a survey item that is labeled 'hotness' (Felton, Mitchell, & Stinson, 2004). The options for responding to the 'hotness' survey item are 'Yeah' and 'Um, No.' Three of the other survey items (whether the student would take another course with the professor, whether the class was taken for credit, and whether the textbook was used also use the 'Yeah' and 'Um. No.' response options (Rate My Professors, 2016).

The existence of the 'hotness' rating may negatively affect perceptions of the professional tone of the Rate My Professors online reputation system (Lang, 2003). In contrast, students writing comments as part of traditional student evaluations of teaching have been found to take the task seriously (Brockx, Van Roy, & Mortelmans, 2012).

4.7 Timing Issues in Online Reputation Systems

Buyers and sellers who choose to post ratings using the eBay Feedback Forum must enter their ratings within a sixty day period following the completion of a transaction (Frequently Asked Questions, 2016).

Users of the Rate My Professors online reputation system can enter ratings of professors at any time. Ratings can be entered before a student begins a class, at any time during the term of the class, and at any time after a class has ended.

In contrast, traditional student evaluations are generally conducted near the end of an academic term as students are completing a course.

5. Properties of Online Reputation Systems and Information Quality

Table 2 below presents a framework for understanding the properties and information quality of online reputation systems. The columns of the table contain the four categories of information quality contained in the Wang and Strong (1996) framework of information quality. The rows of the column contain the properties of online reputation systems discussed in the previous section of this paper. Each cell of the table gives expected effects of a property of online reputation systems on the relevant category of information quality. These effects are articulated in terms of the most salient dimensions of information quality that are expected to be affected by the relevant property of online reputation systems. Dimensions of information quality that are not expected to be affected by a particular design property are not noted except in cells of the framework with no expected effects for all of the dimensions in an information quality category.

	Information Quality Category			
	Intrinsic Data Quality	**Contextual Data Quality**	**Representational Data Quality**	**Accessibility Data Quality**
Anonymity	Anonymous ratings tend to decrease perceptions of believability, accuracy, and reputation.	Anonymous ratings tend to decrease perceptions of value-added and relevancy.	Anonymous ratings tend to decrease perceptions of interpretability.	No effect.
Authentication	Authenticated ratings tend to increase perceptions of believability, accuracy, and reputation.	Authenticated ratings tend to increase perceptions of value-added and relevancy.	Authenticated ratings tend to increase perceptions of interpretability.	No effect.
Reciprocity	Reciprocity may have mixed effects on perceptions of believability, accuracy, and objectivity because of a bias favoring the posting of positive ratings in the presence of reciprocity.	Reciprocity may increase perceptions of completeness because of a tendency for one party to post ratings to reciprocate ratings posted by a partner in a business transaction.	Reciprocity may have mixed effects on perceptions of interpretability and ease of understanding because of a bias favoring the posting of positive ratings in the presence of reciprocity.	No effect.
Sampling Plan	A more comprehensive sampling plan may have a positive effect on perceptions of reputation.	A more comprehensive sampling plan may have a positive effect on perceptions of value-added, relevancy, completeness, and appropriate amount of data.	A more comprehensive sampling plan may have a positive effect on interpretability.	No effect.

Consent	User consent to being rated may have a positive effect on believability, objectivity, and reputation.	User consent to being rated may have a positive effect on value-added.	User consent to being rated may have a positive effect on interpretability.	No effect.
Tone	A professional tone may have a positive effect on perceptions of believability, accuracy, objectivity, and reputation.	No effect.	No effect.	No effect.
Timing	A shorter time frame within which ratings must be entered may have a positive effect on perceptions of believability, accuracy, objectivity, and reputation.	A shorter time frame within which ratings must be entered may have a positive effect on perceptions of timeliness.	A shorter time frame within which ratings must be entered may have a positive effect on perceptions of interpretability.	No effect.

Table 2. Effects of Properties of Online Reputation Systems on Information Quality

6. Application of the Framework to eBay's Feedback Forum and the Rate My Professors Online Reputation System

Properties of eBay's Feedback Forum and the Rate My Professors online reputation system are discussed above in this paper. The two tables presented in this section discuss the properties of these two online reputation systems in terms of their effects on the categories of information quality developed in the Wang and Strong (1996) information quality framework. The accessibility data quality category is omitted from the tables in this section of the paper because of the absence of expected effects of the properties of online reputation systems on the accessibility of data.

6.1 Application of the Framework to eBay's Feedback Forum

Table 3 presents an application of the framework introduced in Table 2 to an analysis of the eBay Feedback Forum. As discussed above, the accessibility data quality category is omitted from this table.

	Information Quality Category		
	Intrinsic Data Quality	**Contextual Data Quality**	**Representational Data Quality**
Anonymity	**Enhanced** Perceptions of believability, accuracy, and reputation may be enhanced by the linkage between ratings and identifiable user accounts.	**Enhanced** Perceptions of value-added and relevancy may be enhanced by the linkage between ratings and identifiable user accounts.	**Enhanced** Perceptions of interpretability may be enhanced by the linkage between ratings and identifiable user accounts.
Authentication	**Enhanced**	**Enhanced**	**Enhanced**

	Perceptions of believability, accuracy, and reputation may be enhanced by the linkage between ratings and authenticated business transactions.	Perceptions of value-added and relevancy may be enhanced by the linkage between ratings and authenticated business transactions.	Perceptions of interpretability may be enhanced by the linkage between ratings and authenticated business transactions
Reciprocity	**Mixed Effects** Perceptions of believability, accuracy, and objectivity may be affected by awareness of positive bias of postings due to reciprocity.	**Enhanced** Perceptions of completeness may be enhanced by awareness that reciprocity encourages buyers and sellers to encourage each other to post ratings.	**Mixed Effects** Perceptions of interpretability and ease of understanding may be affected by awareness of positive bias of postings due to reciprocity.
Sampling Plan	**Enhanced** Perceptions of reputation may be enhanced by awareness that all buyers and sellers are made aware of the existence of the online reputation system.	**Enhanced** Perceptions of value-added, relevancy, completeness, and appropriate amount of data may be enhanced by awareness that all buyers and sellers are made aware of the existence of the online reputation system.	**Enhanced** Perceptions of interpretability may be enhanced by awareness that all buyers and sellers are made aware of the existence of the online reputation system.
Consent	**Enhanced** Perceptions of believability, objectivity, and reputation may be enhanced by awareness that buyers and sellers implicitly consent to being rated.	**Enhanced** Perceptions of value-added may be enhanced by awareness that buyers and sellers implicitly consent to being rated.	**Enhanced** Perceptions of interpretability may be enhanced by awareness that buyers and sellers implicitly consent to being rated.
Tone	**Enhanced** Perceptions of believability, accuracy, objectivity, and reputation may be enhanced by existence of a professional tone on the online reputation system.	**No Effect.**	**No Effect.**
Timing	**Enhanced** Perceptions of believability, accuracy, objectivity, and reputation may be enhanced by the relatively short time frame within which ratings must be entered**.**	**Enhanced** Perceptions of timeliness may be enhanced by the relatively short time frame within which ratings must be entered.	**Enhanced** Perceptions of interpretability may be enhanced by the relatively short time frame within which ratings must be entered.

Table 3. Information Quality and Properties of eBay Feedback Forum

6.2 Application of the Framework to the Rate My Professors Online Reputation System

Table 4 presents an application of the framework introduced in Table 2 to an analysis of the Rate My Professors online reputation system. As discussed above, the accessibility data quality category is omitted from this table.

	Information Quality Category		
	Intrinsic Data Quality	**Contextual Data Quality**	**Representational Data Quality**
Anonymity	**Diminished** Perceptions of believability, accuracy, and reputation may be diminished because of the lack of a linkage between ratings and identifiable user accounts.	**Diminished** Perceptions of value-added and relevancy may be diminished because of the lack of a linkage between ratings and identifiable user accounts.	**Diminished** Perceptions of interpretability may be diminished because of the lack of a linkage between ratings and identifiable user accounts.
Authentication	**Diminished** Perceptions of believability, accuracy, and reputation may be diminished because of the lack of a linkage between ratings and authenticated user accounts and course enrollments.	**Diminished** Perceptions of value-added and relevancy may be diminished because of the lack of a linkage between ratings and authenticated user accounts and course enrollments.	**Diminished** Perceptions of interpretability may be diminished because of the lack of a linkage between ratings and authenticated user accounts and course enrollments.
Reciprocity	**Diminished** Perceptions of believability, accuracy, and objectivity may be diminished because of beliefs that a lack of reciprocity may encourage more dissatisfied users to post ratings.	**Diminished** Perceptions of completeness may be diminished because of an awareness that a lack of reciprocity may reduce the number of ratings posted to the online reputation system.	**Diminished** Perceptions of interpretability and ease of understanding may be diminished because of beliefs that a lack of reciprocity may encourage more dissatisfied users to post ratings.
Sampling Plan	**Diminished** Perceptions of reputation may be diminished by awareness that the absence of a direct relationship between the online reputation system and all potential raters means that not all potential raters are made aware of the existence of the online reputation system.	**Diminished** Perceptions of completeness may be diminished by awareness that the absence of a direct relationship between the online reputation system and all potential raters means that not all potential raters are made aware of the existence of the online reputation system.	**Diminished** Perceptions of interpretability may be diminished by awareness that the absence of a direct relationship between the online reputation system and all potential raters means that not all potential raters are made aware of the existence of the online reputation system.
Consent	**Diminished** Perceptions of believability, objectivity, and reputation may be diminished by	**Diminished** Perceptions of value-added may be diminished by awareness that professors do not consent to being rated.	**Diminished** Perceptions of interpretability may be diminished by awareness that professors do not consent to being rated.

	awareness that professors do not consent to being rated.		
Tone	**Diminished** Perceptions of believability, accuracy, objectivity, and reputation may be diminished by the existence of ratings of physical appearance.	**No Effect.**	**No Effect.**
Timing	**Diminished** Perceptions of believability, accuracy, objectivity, and reputation may be diminished by the relatively long time frame within which ratings can be entered**.**	**Diminished** Perceptions of timeliness may be diminished by the relatively long time frame within which ratings can be entered.	**Diminished** Perceptions of interpretability may be diminished by the relatively long time frame within which ratings can be entered.

Table 4. Information Quality and Properties of the Rate My Professors Online Reputation System

7. Conclusion

This paper has developed and applied a framework for understanding the properties and information quality of online reputation systems. The framework integrates categories of information quality developed by Wang and Strong (1996) with the seven properties of online reputation systems developed in this paper: anonymity, authentication, reciprocity, sampling plan, consent, tone, and timing. The framework is applied to an analysis of eBay's Feedback Forum and the Rate My Professors online reputation system.

The framework has implications for designers and users of online reputation systems as well as scholars interested in validating, testing, and applying the framework. Designers of online reputation systems may find the framework valuable as they consider the extent to which feedback in online reputation systems should permit or require anonymous ratings and comments and the extent to which ratings and comments should be authenticated. The framework can also be used by online reputation system designers to consider issues of the reciprocity, tone, and timing of ratings and comments. Faculty teaching courses on information literacy can use the framework to guide the design of course instruction aimed at encouraging users of online reputation systems to critically evaluate the information published by online reputation systems. Additionally, the framework provides the basis for scholars interested in conducting empirical studies of user perceptions of online reputation systems.

Limitations of this study include the focus on two exemplar online reputation systems and on seven properties of online reputation systems. Future studies should be conducted to examine additional properties of online reputation systems such as the importance of ratings and incentives for entering and publishing high quality ratings. Future studies should also investigate the characteristics of additional online reputation systems. Empirical studies examining user perceptions of online reputation systems using the framework are also suggested.

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Appendix 1. Data Elements Used to Measure Dimensions of Data Quality (Wang & Strong, 1996)

Dimension of Data Quality	Data Elements
Believability	Believable
Accuracy	Data are certified error free; Error free; Accurate; Correct; Flawless; Reliable; Errors can be easily identified; The integrity of the data; Precise
Objectivity	Unbiased; Objective
Reputation	The reputation of the data source; The reputation of the data
Value-added	Data give you a competitive edge; Data add value to your operations
Relevancy	Applicable; Relevant; Interesting; Usable
Timeliness	Age of data
Completeness	The breadth of information; The depth of information; The scope of information
Appropriate amount of data	The amount of data
Interpretability	Interpretable
Ease of understanding	Easily understood; Clear; Readable
Representational consistency	Data are continuously presented in same format; Consistently represented; Consistently formatted; Data are compatible with previous data
Concise representation	Well-presented; Concise; Compactly represented; Well-organized; Aesthetically pleasing; Form of presentation; Well-formatted; Format of the data
Accessibility	Accessible; Retrievable; Speed of access; Available; Up-to-date
Access security	Data cannot be accessed by competitors; Data are of a proprietary nature; Access to data can be restricted; Secure

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